The Influence of the Blended Learning Model on Students Digital Learning: Meta-Analysis

Komari¹*, Dewanto², Tomi Apra Santosa³, Yusak Noven Susanto⁴, Dewi Maharani Rachmaningsih⁵

¹ Lecturer of English Literature, Faculty of Economics, Literature, Social and Politics, Jayapura University of Science and Technology
² Lecturers of Mechanical Engineering Education, Faculty of Engineering, Surabaya State University
³ Civil Engineering Lecturers, Academy of Adikarya Engineering
⁴ Lecturers of Christian Education, Duta Panisal Theological College
⁵ Lecturer in Archives, Faculty of Law, Social and Political Sciences, Open University

* Corresponding Author. E-mail: arikom08@gmail.com

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Abstract

Blended learning model research has been widely carried out in the world of education, but no meta-analysis of blended learning models has been found on students’ digital literacy. This research aims to determine the effect of the blended learning model on students’ digital literacy. This research is a type of meta-analysis research. This research analyzes 11 effect sizes sourced from Google Scholar, ERIC, ScienceDirect and Wiley from 2019-2023 which includes 220 students. Data analysis with the help of the JSAP application. This research concludes that the summary effect size value obtained from the random effect model is 0.793 with medium criteria. These findings show that the blended learning model can have a significant influence on students’ digital literacy.

Keywords: Blended Learning, Effect Size, Digital Literacy, Meta-analysis
Introduction

Digital literacy is an ability that students must have in facing the industrial revolution 4.0 towards 5.0 society (Yildirim &; Öztürk, 2022; Muh et al., 2023). Digital literacy plays an important role in supporting the quality of student learning (Faridah, 2022). According to Suwarto et al., (2022) that digital literacy helps students more easily access information, technology, and knowledge that can support the learning process. Moreover, Digital literacy forms a more critical and creative mindset of students in finding solutions in problem solving (Putra et al., 2023; Prachagool, 2022; Cuban, 2022). Digital literacy trains students more easily in carrying out learning activities by utilizing technology (Rahman &; Ristiana, 2020; Sulistyarini et al., 2022; Rahman et al., 2023; Elfira et al., 2023; Munawar et al., 2021). So, digital literacy is a major factor for students and teachers in facing the 21st century.

But in reality, the digital literacy of Indonesian students is still relatively low (Wirdayani et al., 1844). This can be seen from the 2018 PISA-OECD survey stating that the level of science literacy of Indonesian students is relatively low, only obtaining a score of 393, ranked 71 out of 78 countries (Suharyat et al., 2022; Zulkifli et al., 2022; Ichsan et al., 2023; Oktarina et al., 2021; Luciana et al., 2023). Learning activities that do not involve students to be active so that the learning process is centered on the teacher (Nurtamam et al., 2023; Zulyusri et al., 2023; Rahman et al., 2023; Suryono et al., 2023). Teachers do not use technology-based media that can help students more easily understand the subject matter (Khoiroh et al., 2017; Hamzah et al., 2022; Mursid et al., 2022). Furthermore, the selection of inappropriate learning models and methods to encourage students' digital literacy (Ichsan et al., 2022; Sofianora et al., 2023; Zulkifli et al., 2022).

Blended learning is a learning model that can encourage students' digital literacy skills (Rahmasiwi et al., 2023). The blended learning model is a learning model that combines online learning and face-to-face learning (Rahmi et al., 2022; Nida et al., 2020; Yapici & Akbayin, 2012). The blended learning model helps students learn by utilizing technology (Fazal &; Bryant, 2019; Santosa et al., 2021; Rahman et al., 2023). Furthermore, the blended learning model combines teaching materials, media, and learning resources that can be utilized in the learning process (Setiadi et al., 2022). Research results (Setiawan et al., 2022; Khoiroh et al., 2017) The blended learning model can foster student interest and motivation in learning. Not only that, the blended learning model can increase students' understanding in mastering the subject matter (Wuxue, 2023; Radulović et al., 2023).

Previous research explained that blended learning models have a significant influence on students' digital literacy (Kade et al., 2019; Fitriani et al., 2023). The results of research by Li et al., (2022) that the blended learning model can train students to be more creative and innovative in learning. As for the gap in this study, many studies related to blended learning did not find meta-analysis of blended learning models on students' digital literacy. This study aims to determine the effect of blended learning models on students' digital literacy.

Methods

This study is a type of meta-analysis research. Meta-analysis is a type of research that analyzes previous research using statistics (Suharyat et al., 2022; Suparman et al., 2021; Chamdani et al., 2022; Suaimi et al., 2022; Ichsan et al.,
2022; Bernard et al., 2014; Santos et al., 2021). The meta-analysis aims to determine the effect of blended learning models on students' digital literacy. According to (Cohen et al., 2007; Borenstein & Hedges, 2009) The steps in meta-analysis research are: 1) determining inclusion criteria, 2) collecting data and coding data and 3) conducting data analysis with statistics.

The inclusion criteria in this meta-analysis are that the research must come from journals indexed by SINTA and Scopus, the research has an experimental class with a blended learning model and a conventional model control class, journal publications in 2019-2023, the study must report complete data for effect size analysis and a large sample size of 20 students. The keywords for searching data sources are the "blended learning" model, the influence of the blended learning model on digital literacy", "implementation of the blended learning model". The data analysis technique is quantitative statistical analysis with the help of JSAP application. Data analysis calculated the value of summary effect size or mean average effect size of the entire study. The criteria for effect size values can be seen in Table 1.

<table>
<thead>
<tr>
<th>Effect Size</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 &lt; d &lt; 0.20</td>
<td>Low</td>
</tr>
<tr>
<td>0.20 &lt; d &lt; 0.80</td>
<td>Medium</td>
</tr>
<tr>
<td>d &gt; 0.80</td>
<td>High</td>
</tr>
</tbody>
</table>

Source : (Ramdhayani et al., 2019; Putra et al., 2023; Karim et al., 2023)

**Result and Discussion**

From searching 217 studies through the Google Scholar database, Eric, ScienceDirect, Wiley and ProQuest obtained 11 journals that met the inclusion criteria. Research that has met the inclusion criteria is calculated effect size value which can be seen in Table 2.

<table>
<thead>
<tr>
<th>Journal Code</th>
<th>Year</th>
<th>Effect Size</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>2022</td>
<td>0.97</td>
<td>High</td>
</tr>
<tr>
<td>A2</td>
<td>2022</td>
<td>0.68</td>
<td>Medium</td>
</tr>
<tr>
<td>A3</td>
<td>2021</td>
<td>1.20</td>
<td>High</td>
</tr>
<tr>
<td>A4</td>
<td>2019</td>
<td>0.72</td>
<td>High</td>
</tr>
<tr>
<td>A5</td>
<td>2023</td>
<td>2.10</td>
<td>High</td>
</tr>
<tr>
<td>A6</td>
<td>2023</td>
<td>0.73</td>
<td>Medium</td>
</tr>
<tr>
<td>A7</td>
<td>2023</td>
<td>0.78</td>
<td>Medium</td>
</tr>
<tr>
<td>A8</td>
<td>2019</td>
<td>1.07</td>
<td>High</td>
</tr>
<tr>
<td>A9</td>
<td>2020</td>
<td>0.45</td>
<td>Low</td>
</tr>
<tr>
<td>A10</td>
<td>2022</td>
<td>0.82</td>
<td>High</td>
</tr>
<tr>
<td>A11</td>
<td>2021</td>
<td>0.63</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Table 3. Summary Effect or Mean Effect Size

<table>
<thead>
<tr>
<th>Q</th>
<th>Df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omnibus test of Coefficients Model</td>
<td>62.551</td>
<td>1</td>
</tr>
<tr>
<td>Test of Residual Heterogeneity</td>
<td>197.320</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 3 shows a value of Q = 197.320 greater than 62.551 with a confidence level of 95. Furthermore, the value (p < 0.001) means that the distribution of effect size in this study is heterogeneously distributed. So, a random effect model was more effectively used to analyze 11 studies.
Next, it calculated the publication bias of the 11 studies that had been analyzed. Calculation of publication bias in this study with funnel plot and Rosenthal Fail Safe (FSN) (Chamdani et al., 2022; Zhang et al., 2015; Hidayah, 2023; Taşdemir, 2022). The results of the calculation of publication bias with funnel plot can be seen in figure 1.

![funnel plot](image)

**Figure 1.** Funnel Plot

Based on figure 1. Showing that the distribution of effect size in the funnel plot is not yet known whether symmetric or asymmetric, it is necessary to do the Rosenthal Fail Safe N (FSN) test. The results of publication bias analysis with Rosenthal Fail Safe N (FSN) can be seen in Table 4.

<table>
<thead>
<tr>
<th>Fail: Safe-N</th>
<th>Target Significance</th>
<th>Observed Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosenthal 1</td>
<td>566.00</td>
<td>0.050</td>
</tr>
</tbody>
</table>

Table 4. Rosenthal Fail Safe N (FSN) Test Results

Based on table 5, explain the value of summary effect size or mean effect size (ES = 0.793; SE = 0.15; Z = 8.717) medium criterion. Furthermore, the value of 95% confidence interval lower is 0.614 and upper is 0.971. These results show that there is an influence of blended learning models on students' digital literacy compared to conventional models.

The results of Tang & Chaw's (2016) research on the blended learning model have a significant influence on students' digital literacy. The blended learning model helps students be more active and innovative in utilizing technology in learning (Soeprijanto, 2022; Mcguinness, 2019). Radulović et al., (2023) stated that blended learning models can encourage interest and motivation that help students cultivate digital literacy. Digital literacy is needed by students in facing the 21st century. Students who have digital literacy will find it easier to find and open big data that can be used in education (Katsarou, 2021; Soutthaboualy et al., 2021). So, the
**blended learning** model helps students learn more independently.

Learning blended learning models can help the student learning process without time limits. The **blended learning** model allows students to learn online through learning platforms accessed through the internet network (Mphahlele et al., 2021), so as to improve students' digital literacy skills. Not only that, the blended learning model of students is more confident in learning and creative (Katasila & Poonpon, 2022). Furthermore, the blended learning model allows students to access information quickly to increase student knowledge (Gault et al., 2022). Knowledge is all information that can be accessed through various sources (Ferry et al., 2019). So, the **blended learning** model really supports the quality of student learning in growing digital literacy today.

**Conclusion**

From the meta-analysis research, it can be concluded that the summary effect size value obtained from the random effect model is 0.793 with medium criteria. These findings show that blended learning models can have a significant effect on students' digital literacy. The blended learning model trains students to learn more independently and creatively. Furthermore, the blended learning model helps students and teachers more easily carry out the learning process indefinitely.

**Daftar Pustaka**


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Putra, M., Rahman, A., Suhayat, Y.,


